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HAE UAV PO/#307/bmw

21 December 1995

MEMORANDUM TO: Department of the Navy, Technical Publishing Team

SUBJECT: Approval for public release of the High Altitude Endurance UAVs paper by  
Michael McDaniel

I authorize public release of the subject paper to be published in the United States Naval Institute Proceedings for the March/April 1996 issue. I understand the Department of the Navy will determine the level of authorized distribution.

The proposed reviewer was listed as John Entzminger. Due to his retirement, the paper was reviewed by Mr. Charles Heber. If you have further questions please call me at (703)524-5199.

A handwritten signature in black ink, appearing to read "C. E. Heber, Jr." followed by a stylized surname.

C. E. Heber, Jr.  
Director, ARPA HAE UAV PO

## High Altitude Endurance UAVs

by  
Michael L. McDaniel  
715 words

Although not Navy programs, the Tier 2+ and Tier 3- Unmanned Air Vehicles (UAVs) of the Advanced Research Project Agency (ARPA) may be of great use in naval operations.

These UAVs are the products of the High Altitude Endurance UAV program at ARPA. This program is intended to develop and demonstrate two rival reconnaissance UAVs, then let the users decide on the force balance and needed capabilities based on the performance of the candidates. The UAVs, designated Tier 2+ and Tier 3-, are intended to be theater-level assets supplementing existing reconnaissance platforms.

Characteristics of the Tier 2+ and 3- UAVs are presented in Table I.

Table I  
HIGH ALTITUDE ENDURANCE UAVs

Characteristic	Tier 2+	Tier 3-
Contractor	Teledyne Ryan	Lockheed/Boeing
Design emphasis	Endurance, payload, altitude	Low observables
Gross weight, lbs.	26,000	8,600
Length, ft.	44.4	15
Wingspan, ft.	116	69
Powerplant	1 x Allison A3007 (7,200 lbs thrust)	1 x Williams FJ44 (1,900 lbs thrust)
Operating radius, nm	3,000	500
Time on station, hours	24	8
Payload	SAR + EO/IR	SAR or EO
Scanned area per mission, nmi <sup>2</sup>	40,000	16,900
Unit price (FY95\$)	\$10 million	\$10 million

Guidance for both UAVs is inertial with GPS updating, with differential GPS for takeoff and landing. Both UAVs are autonomous, with no direct control inputs being made by the operator. Instead, the operator will load waypoints into the autopilot, which is updatable in flight, and the UAV's guidance system will make control inputs.

Communications will be by line-of-sight and satellite data links. Tier 2+ and Tier 3- will receive commands and report aircraft status through military UHF SATCOM. Tier 3- will transmit intelligence information the same way, while Tier 2+ will use Ku-band commercial SATCOM for sending imagery, due to the extremely high anticipated data rates.

A common ground station is under development, which will be capable of operating both Tier 2+ and Tier 3- UAVs. The ground station has been divided into two parts: The Launch and Recovery Element, which controls the UAV during takeoff and landing; and the Mission Control

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Element, which controls the UAV during the mission and serves as a communication node for disseminating reconnaissance data.

Two prototypes of each UAV are being built, which will undergo developmental testing through 1997. These will be followed by eight further examples of each UAV, which will support operational demonstrations in 1998. These operational demonstrations will determine the relative merit of each type of UAV, whether or not modifications are needed, and the force structure of an operational UAV fleet.

What does this mean to the Fleet? It means a revolution in intelligence gathering. Instead of begging the NCA for a satellite pass or a U-2 flight, theater-level commanders will have their own extremely capable assets. The trickle of intelligence that we have today will become a flood of facts, enough to support not only the theater commander, but lower-echelon commanders as well. In theory, a handful of Tier 2+ and 3- UAVs could create a single, up-to-date, extremely detailed picture of the battlefield that could be distributed to everyone from the NCA to squad leaders. This kind of timely, detailed, coordinated intelligence can win not only battles, but wars.

What must the Fleet do? First, planners must be aware that the Tier 2+ and 3- are on their way, and start thinking about how they can be employed. Remember that Predator was taken from the middle of a test program to go to Bosnia in 1995. These new UAVs will be available before 2000. Second, both UAVs supply tremendous amounts of information. The Fleet needs to consider ways to distribute this information to where it can do the most good. Third, the Fleet should examine housekeeping issues, such as the desirability of installing an MCE in a ship. Finally, everyone should keep alternate missions in mind. Jamming and communications relay are already being discussed, but there may be other roles that ARPA has not yet thought of.

The new Tier 2+ and Tier 3- UAVs represent a potential quantum jump in warfare. But without preparation and planning, their potential to turn the tide of battle will be stillborn. The Fleet must prepare for this new generation of UAVs.